WHAT IS CLAIMED IS:

1. An identification system comprising:

a plurality of identifiable elements;

a plurality of labels, each label associated with a unique or non-unique identifiable element, the labels including reference markers and other markers, the labels generating spectra in response to excitation energy; and

an analyzer for identifying the elements from the spectra of the associated labels, the analyzer calibrating the spectra using reference signals generated by the reference markers.

2. The identification system of claim 1, wherein the labels comprise semiconductor nanocrystals.

3. The identification system of claim 2, wherein each reference marker comprises at least one reference semiconductor nanocrystal.

4. The identification system of claim 3, wherein the reference markers comprise a plurality of reference semiconductor nanocrystals, the reference markers of each label generating a reference signal at a reference wavelength with a reference intensity.

5. The identification system of claim 4, wherein the other markers comprise other semiconductor nanocrystals generating other signals at other wavelengths and with other intensities.

6. The identification system of claim 1, wherein the other markers comprise code signal markers which generate code signals different than the reference signals, the spectra comprising the marker signals and the code signals, and wherein, for at least one label, the analyzer discretely quantifies the code signals emitted by the code signal markers of the label by comparison of the code signals with the reference signal and by selecting signal characteristics of the code signals from among a plurality of discrete, predetermined signal characteristics.

7. The identification system of claim 6, wherein the reference signal of each label has a reference intensity, and wherein the code signals of the label have

code signal intensities, the analyzer discretely quantifying the code signal intensities by comparison to the reference intensity of the label.

8. The identification system of claim 7, wherein the code signal intensities define discrete ratios with the associated reference intensities.

9. The identification system of claim 7, wherein, for each label, the reference intensity comprises at least one member selected from a group consisting of: a highest intensity of the spectra, a lowest intensity of the spectra, a shortest wavelength peak of the spectra, and a longest wavelength peak.

10. The identification system of claim 1, wherein at least some of the reference signals of the labels have common reference wavelengths.

11. The identification system of claim 1, where the reference signals of at least some of the labels have different reference wavelengths.

12. The identification system of claim 11, wherein each reference signal has a reference wavelength, the reference wavelength being a shortest or a longest wavelength of the spectra of the label.

13. The identification system of claim 1, wherein the reference signals have reference wavelengths, and wherein the other signals have other wavelengths, the other wavelengths of each label being discretely quantifiable by reference to the reference wavelength of the label.

14. The identification system of claim 1, wherein the spectrum of a first label comprises signals having a plurality of wavelengths, wherein a spectrum of a second label comprises signals having the plurality of wavelengths, and wherein the analyzer calibrates spectra intensities of the first and second labels based on the reference signals to distinguish the first and second labels.

15. The identification system of claim 1, further comprising at least 1000 labels with associated identifiable elements.

16. The identification system of claim 1, further comprising fewer than 1000 label with associated identifiable elements.

17. The identification system of claim 1, wherein the analyzer comprises a tangible media embodying a machine readable code, the code comprising a listing of a plurality of distinguishable labels.

18. The identification system of claim 17, wherein the code further comprises a listing of identifiable elements and a correlation between each distinguishable label and an associated identifiable element having the distinguishable label.

19. The identification system of claim 1, wherein the identifiable elements comprise at least one member selected from the group consisting of a composition of matter, a fluid, an article of manufacture, a consumer product, and a component for an assembly.

20. A method for sensing a plurality of identifiable elements, the method comprising:

labeling each identifiable element with a reference marker and at least one associated other marker;

energizing the markers of a first label from a first identifiable element so that the markers generate signals;

measuring a spectrum of the signals; and

identifying a first identifiable element from the spectrum by calibrating the spectrum with reference to a reference signal from the reference marker of the first label.

21. A library of elements, the library comprising:

a plurality of identifiable elements, each identifiable element having an associated label with a reference marker, the labels generating spectra in response to an excitation energy, each spectrum including a spectral calibration reference signal from the reference marker.

22. The library of claim 21, wherein the labels comprise semiconductor nanocrystals.

23. The library of claim 22, wherein the semiconductor nanocrystals generate the signals in response to the excitation energy, each reference marker comprising at least one reference semiconductor nanocrystal.

24. The library of claim 23, wherein at least some of the labels comprise at least one other semiconductor nanocrystal generating another signal at another wavelength in response to the excitation energy, the other wavelength different than a reference wavelength of the reference signal.

25. The library of claim 22, wherein at least some of the labels comprise other markers associated with the reference marker, the other markers generating other signals in response to the excitation energy, the other signals differing from the associated reference signals, and discretely quantifiable by comparison of the other signals with the associated reference signals.

26. The library of claim 25, wherein the reference signals have reference intensities, and wherein the other signals have other intensities, the other intensities each being discretely quantifiable by comparison to the associated reference intensity.

27. The library of claim 26, wherein ratios defined by the other intensities to the associated reference intensities define discrete intensity ratio increments.

28. The library of claim 25, wherein, for each spectrum, the reference intensity is a highest intensity of the spectrum or a lowest intensity of the spectrum.

29. The library of claim 25, wherein at least some of the labels have a first other intensity higher than the reference intensity, and a second other intensity lower than the reference intensity.

30. The library of claim 25, wherein, for each label, the reference signal has a reference wavelength, the reference wavelength being a shortest or a longest wavelength of the spectra of the label.

31. The library of claim 25, wherein the reference signals have reference wavelengths and the other signals have other wavelengths, at least some of the

labels including a first other wavelength shorter than the reference wavelength of the label, and a second other wavelength longer than the reference wavelength of the label.

32. The library of claim 25, where the reference signals of at least some of the labels have differing reference wavelengths.

33. The library of claim 25, wherein at least some of the reference signals of the labels have common reference wavelengths.

34. The library of claim 25, wherein the reference signals of the labels have differing reference wavelengths.

35. The library of claim 21 wherein the spectrum of a first label comprises signals having a plurality of wavelengths, wherein a spectrum of a second label comprises signals having the plurality of wavelengths, the first and second spectra having differing overall intensities, the first and second labels distinguishable by calibration of the first and second spectra based on intensities of the reference signals of the first and second signals, respectively.

36. The library of claim 21, further comprising at least 1000 differentiable labels.

37. The library of claim 21, further comprising fewer than 1000 differentiable labels.

38. The library of claim 21, further comprising a tangible media embodying a machine readable code, the code comprising a listing of the labels.

39. The library of claim 38, wherein the code further comprises a listing of identifiable elements and a correlation between each label and an associated identifiable element having the label.

40. The library of claim 21, wherein the identifiable elements comprise at least one member selected from the group consisting of a composition of matter, a fluid, an article of manufacture, a consumer product, a bead, and a component for an assembly.

41. A method comprising:

labeling an identifiable element with a label;

measuring a spectrum generated by the label, the spectrum comprising a plurality of signals; and

identifying the element by selecting a first wavelength range encompassing a first signal of the spectra, and by determining a wavelength of the first signal within the first range.

42. The method of claim 41, wherein the element is labeled by applying at least one semiconductor nanocrystals to the element, the semiconductor nanocrystals generating at least some of the signals in response to excitation energy.

43. The method of claim 41, further comprising selecting a second wavelength range encompassing a second signal of the spectra, and by determining a wavelength of the second signal within the second range.

44. The method of claim 43, further comprising, for each other signal of the spectra, selecting another wavelength range encompassing the other signal and determining a wavelength of the other signal, wherein no more than one signal of the spectra is disposed within each wavelength range.

45. The method of claim 43, wherein the wavelengths of the first and second signals are determined by selecting the wavelengths of the signals from a plurality of discrete wavelengths within the ranges.

46. The method of claim 45, wherein the discrete wavelengths within each range are sufficiently close that two signals at adjacent discrete wavelengths within the range would substantially overlap.

47. The method of claim 45, wherein the discrete wavelengths within the ranges are predetermined.

48. The method of claim 45, wherein the discrete wavelengths within the ranges are separated by about 5 nm or more.

49. The method of claim 45, wherein the discrete wavelengths within the ranges are separated by about 30 nm or more.

50. The method of claim 45, wherein the ranges are separated.

51. The method of claim 50, wherein the ranges are sufficiently separated so that a pair of signals at adjacent discrete wavelengths within adjacent wavelength ranges are sufficiently separated for independent identification of the discrete wavelengths of each signal of the pair.

52. The method of claim 50, wherein the ranges are separated by more than about 30 nm.

53. The method of claim 50, wherein each wavelength range includes at least 5 predetermined discrete wavelengths.

54. The method of claim 53, wherein there are at least three non-overlapping wavelength ranges.

55. The method of claim 41, further comprising identifying a plurality of elements in response to spectra generated from other labels associated with the elements by selecting wavelength ranges encompassing signals of the spectra, and by determining wavelengths of the signals within the ranges.

56. The method of claim 55, wherein no more than one signal from each spectrum is disposed within each wavelength range.

57. The method of claim 55, further comprising establishing predetermined wavelength ranges, the plurality of elements being identified using the predetermined wavelength ranges.

58. The method of claim 57, further comprising establishing predetermined discrete wavelengths within the predetermined wavelength ranges, the wavelengths of the signals being selected from the predetermined wavelengths.

59. The method of claim 55, further comprising rejecting labels having excessive overlap between adjacent discrete wavelengths from different adjacent wavelength ranges.

60. The method of claim 55, wherein the wavelength determining step comprises a binary determination between a presence of the discrete wavelength and an absence of the discrete wavelength.

61. The method of claim 60, wherein the spectra of the labels comprise a plurality of separated luminescent signals including signals within the first range, the first range being predetermined, and a second predetermined wavelength range, a discrete wavelength of at least one of the signals of each spectrum being different than a discrete wavelength of the spectrum of every other spectrum.

62. The method of claim 55, further comprising measuring a discrete intensity of the discrete wavelength.

63. The method of claim 55, wherein the label and the other labels comprise intermingled markers.

64. The method of claim 63, wherein the signals of a first label are encompassed within the first predetermined wavelength range, and wherein the signals of a second label are encompassed within another wavelength range such that the spectra of the first and second labels are separated.

65. A method for sensing a plurality of intermingled labels, the method comprising:

energizing the labels so that the labels generate signals;

identifying a first label by measuring a first discrete wavelength from among a plurality of discrete wavelengths within a first wavelength range; and

identifying a second label by measuring a second discrete wavelength from among a plurality of discrete wavelengths within a second wavelength range, the first and second ranges being separated.

66. The method of claim 65, further comprising adding a plurality of labels to a fluid at an associated plurality of process steps so that the labels indicate the process steps performed to the fluid.

67. An inventory system comprising:

a plurality of identifiable elements; and

a plurality of labels having markers, each label associated with an element, each marker generating a signal when energized so that each label emits an identifiable spectrum, at least some of the spectra comprising a plurality of the signals, each signal of the spectra having a discrete wavelength selected from within a dedicated wavelength range, the ranges sufficiently separated so that the signals in different ranges are independently identifiable.

68. The inventory system of claim 67, further comprising an analyzer having a signal sensor in optical communication with the signals and a processor, the processor selecting a first discrete wavelength from among a plurality of discrete wavelengths within a first wavelength range in response to a first signal of a first spectra, the processor selecting a second discrete wavelength from among a plurality of adjacent discrete wavelengths within a second wavelength range, the first and second ranges being separated, the processor having a database of the identifiable elements and the associated labels and generating an element identification signal in response to the first and second selected wavelengths.

69. The inventory system of claim 68, wherein the labels comprises at least one bead including a matrix, the markers including at least one semiconductor nanocrystal supported in the matrix.

70. The inventory system of claim 67, wherein each label comprises at least one bead, and wherein at least some of the beads have a plurality of markers comprising an associated plurality of semiconductor nanocrystal populations, each population including a plurality of semiconductor nanocrystals that emit a substantially uniform wavelength when energized so as to define the signal of the marker.

71. The inventory system of claim 67, wherein each label has a unique spectra including no more than one discrete wavelength selected from a plurality of predetermined wavelengths within each of a plurality of separated wavelength ranges.

72. An inventory label generating method comprising:

generating a plurality of candidate labels; and

selecting a plurality of acceptably distinguishable labels from among the candidate labels by determining spectra emitted by the candidate labels when the candidate labels are energized, and by comparing the spectra of the candidate labels.

73. The method of claim 72, wherein the labels comprise semiconductor nanocrystals.

74. The method of claim 72, wherein the candidate labels are generated by combining a plurality of markers, each marker emitting a marker signal at an associated signal wavelength in response to excitation energy.

75. The method of claim 72, further comprising directing an excitation energy toward the markers and measuring the spectra emitted by the labels.

76. The method of claim 72, wherein the spectra of the candidate labels are determined by modeling a combination of a plurality of marker signals.

77. The method of claim 76, further comprising calculating at least one of the signals by modeling emissions from a manufacturable marker.

78. The method of claim 77, further comprising adjusting the calculated signals from the manufacturable marker in response to measured marker signal variations.

79. The method of claim 76, further comprising measuring at least one of the signals by energizing a marker so that the marker emits the signal.

80. The method of claim 72, further comprising comparing at least some of the candidate labels with a library of distinguishable labels to determine if the candidate labels are acceptable, and adding acceptable candidate labels to the library.

81. A method for identifying a plurality of identifiable elements, the method comprising:

energizing a plurality of labels so that a first marker of each label generates a first signal with a first wavelength peak, at least some of the labels comprising multiple-signal labels, each multiple-signal label having a second marker generating a second signal with a second wavelength peak;

measuring the first wavelength peaks;

for each multiple-signal label, measuring the second wavelength peak at at least a predetermined minimum wavelength separation from the associated first peak; and

identifying the labels in response to the measured peaks.

82. The method of claim 80, wherein each predetermined minimum wavelength separation is at least as large as a full width half maximum (FWHM) of at least one of the associated first peak and the associated second peak.